

Tax Disincentives to Commercial Bank Lending

Anatoli Kuprianov

The Tax Reform Act of 1986 made sweeping changes to the U.S. tax code. It lowered statutory tax rates on both corporate and personal income while eliminating the investment tax credit and a host of other specialized tax deductions in an effort to ensure that all firms paid similar tax rates. The act devoted special attention to commercial banks. Studies commissioned by Congress had found that the commercial banking industry paid much lower average tax rates than most other firms, reinforcing a perception that banks enjoyed many unfair tax advantages. With passage of the Tax Reform Act, the industry lost many tax preferences it had previously enjoyed. Available evidence suggests that tax reform achieved its goal, at least insofar as the commercial banking industry is concerned: average tax rates paid by the U.S. banking industry rose from 24 percent in 1986 to 41 percent in 1995.

Some of the tax preferences banks lost under tax reform originally had been intended to offset the costs of implicit taxes such as the non-interest-bearing reserve requirements banks are obligated to hold with the Federal Reserve (the Fed) as well as the cost of other regulations (Neubig 1984). Under the current tax code, banks face the same treatment as all other financial intermediaries but are still subject to the aforementioned costs. Moreover, Henderson (1987) found that the cost of reserve requirements had not been offset by implicit subsidies associated with the banking charter, such as access to the discount window.

Banks have long argued that the costs of reserve requirements and other burdensome regulations put them at a competitive disadvantage relative to other financial intermediaries. This assertion has received some support from McCauley and Seth (1992), who found that foreign banks had gained a 45 percent share of the U.S. commercial and industrial loan market by 1991 and attributed this trend to the burden of reserve requirements imposed on U.S. banks.

■ Mike Dotsey, Jeff Lacker, and Ned Prescott provided helpful comments on earlier drafts of this article. Special thanks go to Leigh Ribble of the Board of Governors staff, who made available the data needed to complete the study. Any remaining errors or omissions are the author's. The views expressed are those of the author and do not necessarily represent those of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Deposit insurance premiums levied on U.S. banks also may be viewed as an implicit tax in certain circumstances. Congress recently enacted legislation requiring commercial banks to help pay for the recapitalization of the thrift industry's deposit insurance fund through a special deposit insurance surcharge. If they are fairly priced, deposit insurance premiums represent a cost of doing business and not a tax. But when a surcharge is imposed to fund other purposes, deposit insurance premiums may constitute a tax on banks. One interesting question, then, is how significant this tax is in relation to the overall effective tax rate on banks.

These observations raise fundamental issues about the effects of explicit and implicit taxes on the financial system. According to the U.S. Flow of Funds Accounts, the commercial banking industry's share of total credit extended in the United States has fallen steadily in recent years, from almost 45 percent of all credit market assets in 1952 to 22 percent in 1995. While financial innovation is most often blamed for this process of disintermediation, it is worth examining whether the tax and regulatory policies may have contributed to this trend.

This study takes a first step toward analyzing the burden of U.S. bank tax and regulatory policies by developing a comprehensive measure of the overall marginal effective tax rate on commercial bank intermediation. Economists have long recognized that average tax rates do not provide a good measure of the tax disincentives to investment. Most contemporary studies focus instead on the marginal effective tax rate, which measures the marginal tax on investment returns. Studies of bank taxation have been a notable exception to this rule—existing studies have sought to measure the impact of tax reform by estimating average effective tax rates. None of these studies has examined the marginal tax rate on bank lending. Such an exercise turns out to be worthwhile, as it produces some surprising results. In particular, it finds that the behavior of the average effective tax rate has not been a good indicator of the tax disincentives to commercial bank lending.

The discussion that follows begins in Section 1 with an examination of the conceptual issues associated with measuring effective tax rates. Section 2 develops a financial model of banks that can be used to estimate an effective tax rate on commercial bank intermediation. Empirical results are presented in Section 3. The final section reviews the conclusions of the analysis.

1. MEASURING EFFECTIVE TAX RATES ON CAPITAL INCOME

An effective tax rate is a summary statistic that measures the tax burden associated with an activity. Tax codes stipulate not only a statutory tax rate, but also a set of rules for calculating taxable income. These rules often do not yield a

measure of true economic income, however. For this reason, the effective tax rate on investment can differ substantially from the statutory tax rate.

Effective tax rates are sometimes used to measure the impact of taxes on incentives. Many studies compute an average effective tax rate, defined as actual taxes paid divided by capital income, to provide a summary statistic of the tax burden on a particular firm or industry.¹ Fullerton (1984) gives several reasons why average effective tax rates may not accurately measure the disincentives to investment created by the tax code, however. First, relying solely on U.S. taxes paid by a corporation ignores foreign taxes paid by the firm. Second, profits measured for tax purposes differ from profits measured for financial reporting. Third, taxes paid in a given year might not be related to actual profits earned that year due to carryforwards of previous losses and tax credits. Finally, profit measures typically used for calculating average effective tax rates are broken down by firm or by industry rather than by asset class. Thus, while average effective tax rates may be appropriate for measuring cash flows and distributional burden, they do not necessarily measure the disincentives to investment inherent in the tax code.

More recent research on the incentive effects of taxation has focused on the “marginal effective tax rate,” which measures the extra tax resulting from a hypothetical marginal investment by a firm in a given industry. A marginal effective tax rate measures the wedge between the marginal social return to a capital asset and the rate of return earned by the investors who finance its purchase. This wedge can be viewed as a measure of the disincentives to investment created by the tax code.

Thus, marginal effective tax rates are better suited to capture disincentives to investment. Moreover, average tax rates do not reflect the burden of implicit taxes such as reserve requirements or deposit insurance surcharges.² When Fullerton and Henderson (1985) compare average and marginal effective tax rates for 18 industries, they find almost no correspondence between the two measures.

The effective tax rate methodology can be extended to include personal taxes paid on dividends and interest as well as corporate taxes. Measures of the effective tax rate that include personal income taxes can be used to analyze the effect of taxation on the intertemporal allocation of resources. If one is interested in the allocation of capital among competing uses, however, or among competing firms engaged in similar activities but subject to different tax treatment—such as comparison of the tax disincentives to lending between

¹ Harberger’s (1966) classic article on the efficiency effects of capital income taxes uses this approach.

² A notable exception here is Henderson (1987), who incorporates the cost of various implicit taxes into a comprehensive measure of average effective tax rates.

commercial banks and other financial intermediaries—then consideration of personal taxes is unnecessary.³

As noted in the introduction, previous studies on the taxation of commercial banking have focused on the impact of changes in tax laws on total taxes paid by commercial banks.⁴ While such studies can be useful in evaluating the tax burden borne by the industry, the foregoing discussion suggests that they may not be useful in measuring the disincentives to traditional forms of bank credit intermediation created by corporate taxes and reserve requirements. This study differs from other studies on the taxation of commercial banking in that it estimates the marginal effective tax rate on commercial bank intermediation. Using this model, one can also estimate the disincentives to commercial bank intermediation inherent in regulations such as reserve requirements or deposit insurance surcharges. Since the analysis focuses only on the distributional impact of explicit and implicit taxes, it ignores personal taxes paid by households.

Measurements of marginal effective tax rates are typically derived using the “user cost of capital” methodology developed by Hall and Jorgenson (1967). Hall and Jorgenson’s measure of user cost reflects not only the financial cost of capital—that is, the cost of financing an investment—but also the cost of depreciation expenses and income taxes. The user cost is sometimes called an implicit rental rate because it reflects the rental cost the owner of a capital asset would have to charge to cover the costs of financing the purchase of the asset along with the cost of depreciation and income taxes. In a perfectly competitive market, this user cost would exactly equal the rental rate on capital—hence the term implicit rental rate. Once the user cost of capital is derived, the marginal effective tax rate can be calculated from the difference between the before-tax return on investment and the after-tax rate of return earned by the investors who financed the investment.⁵ The following section reviews this methodology in more detail.

2. TAXES, RESERVE REQUIREMENTS, AND THE COST OF CAPITAL

Based on the foregoing discussion, the measurement of effective tax rates requires a precise measure of how explicit and implicit taxes affect the user cost

³ If capital markets are efficient, the opportunity cost of funding will not depend on which agent in the economy buys the bonds or equity issued by the firms. In this case, the cost of capital to firms does not depend on the distribution of personal tax rates. See Fullerton (1984) for a more comprehensive discussion.

⁴ See, for example, Henderson (1987), O’Brien and Gelfand (1987a, b), and Neubig and Sullivan (1987). The latter three studies estimate the impact of the Tax Reform Act of 1986 on after-tax bank profits.

⁵ See Bradford and Fullerton (1981) for a detailed discussion of the conceptual issues involved in measuring marginal effective tax rates.

of capital. Understanding the impact of taxes on the cost of capital requires an understanding of the basic theory of capital budgeting. Accordingly, the analysis that follows first reviews capital budgeting theory and then applies the capital budgeting model to commercial banks. This model is used to derive an expression for the cost of capital that incorporates the effects of reserve requirements as well as deposit insurance premiums and corporate income taxes.

Review of the Basic Capital Budgeting Model

To begin, consider the simple case of a firm that finances a capital investment k by issuing interest-bearing debt, D , and equity, S . Capital invested by the firm earns a constant and known rate of return of ψ per period, so gross revenues accruing to a capital stock k are ψk . Assume capital depreciates at a constant geometric rate δ . Then, the firm can only maintain its capital stock at a constant level k by investing an additional δk units of capital in each period. By doing so, the firm maintains a constant net cash flow of

$$X = (\psi - \delta)k \quad (1)$$

in perpetuity.

The value of the firm's future cash flows is determined by the cost of capital, which, in turn, is determined by the rate of return demanded by investors in capital markets. For simplicity, assume the firm's debt takes the form of a bond issued in perpetuity that pays a fixed coupon R in each period. Let ρ_1 denote the interest rate demanded by bondholders. Then, the value of the firm's outstanding debt is just the present value of all future interest payments:

$$\begin{aligned} D &= \int_0^{\infty} e^{-\rho_1 t} R dt \\ &= R/\rho_1. \end{aligned} \quad (2)$$

Now suppose that all returns net of investment and interest expense are paid to shareholders as dividends, denoted E . Then

$$X = R + E. \quad (3)$$

Since both X and R are constant over time, so is E .

Let ρ_2 denote the rate of return demanded by shareholders. Then, the value of the firm's equity shares will be determined by the present value of all future dividends discounted at the rate ρ_2 :

$$\begin{aligned} S &= \int_0^{\infty} e^{-\rho_2 t} E dt \\ &= E/\rho_2. \end{aligned} \quad (4)$$

The value of all outstanding claims against the firm is just

$$\begin{aligned} V &= D + S \\ &= R/\rho_1 + E/\rho_2 \\ &= \rho^{-1}(R + E), \end{aligned} \tag{5}$$

where

$$\begin{aligned} \rho &= \lambda_1\rho_1 + \lambda_2\rho_2, \text{ and} \\ \lambda_1 &= D/V \\ \lambda_2 &= S/V. \end{aligned} \tag{6}$$

The variable ρ represents the financial cost of capital. It is the rate of return the firm must earn on its investment to be able to pay the rates of return demanded by its bondholders and shareholders.⁶

Substituting from (1) and (3) into (5) yields an expression for the value of the firm in terms of its capital stock, k , and the other variables of the model:

$$V = \rho^{-1}(\psi - \delta)k. \tag{7}$$

Assuming that capital markets are perfectly competitive, the equilibrium present value of cash flows from the investment will just equal the purchase price of the capital acquired by the firm. In equilibrium, then,

$$V = k. \tag{8}$$

From equation (7), this requirement translates into the condition

$$\psi = \rho + \delta. \tag{9}$$

Equation (9) simply shows that in equilibrium the marginal rate of return on investment, ψ , will equal the sum of the financial cost of capital, ρ , which represents the rate of return required by investors, and the marginal cost of depreciation, δ . The term of the right-hand side of equation (9) is the user cost, or implicit rental rate on capital. Note that the stationary nature of this model environment ensures that λ_1 and λ_2 are both constant over time with

$$\begin{aligned} D &= \lambda_1 k, \text{ and} \\ S &= \lambda_2 k. \end{aligned} \tag{10}$$

⁶ In a more rigorously articulated model, ρ_1 and ρ_2 would differ because of varying degrees of risk associated with each type of asset. For purposes of this analysis, however, I adopt the approach common in most intermediate finance textbooks and simply assume that rates of return on various assets can differ without explicitly modeling uncertainty.

This last result, while not important to the foregoing analysis, will be useful later on.

As an aside, the well-known Modigliani-Miller Theorem states that the financial cost of capital, ρ , is independent of the firm's capital structure when capital markets are perfect—that is, when capital markets are perfectly competitive, transactions costs are negligible, and investors have as much information about the firm's investment opportunities as its managers. Under these assumptions, a firm's investment decisions are unaffected by the mix of debt and equity it issues. This result no longer holds when corporate income taxes are introduced into the model, however.

Corporate Income Taxes and the Cost of Capital

The U.S. tax code defines taxable income as operating revenues less interest, allowable depreciation, and other operating expenses. Since this analysis focuses on the effective tax rate on capital, it will abstract from any expenses not directly affecting the cost of capital or the treatment of capital-related expenses such as depreciation allowances. As before, let ψk denote gross revenues and assume that the firm maintains a constant, fixed capital stock. Let Z denote the nominal depreciation allowance permitted under the tax code. Then, taxable profits can be expressed as

$$\pi = \psi k - R - Z, \quad (11)$$

where R denotes nominal interest payments.

Let θ denote the corporate income tax rate. Then, net after-tax cash flow can be calculated by subtracting corporate income taxes from net pre-tax cash flow, as defined in equation (1):

$$X_a = (\psi - \delta)k - \theta\pi. \quad (12)$$

Combining (11) and (12) yields

$$X_a = (1 - \theta)\psi k + \theta R - \delta k + Z. \quad (13)$$

Examine the term on the right-hand side of (13). Because interest expense affects taxable income, the variable R now appears in the expression for net cash flow. As a result, the firm's capital structure will now influence its cost of capital, and therefore its investment decisions. To see how, consider the relationship between interest expense and the firm's capital stock. From equation (2), $R = \rho_1 D$. Together with equation (10), this implies

$$R = \lambda_1 \rho_1 k. \quad (14)$$

Now consider the tax deduction for depreciation. The taxable depreciation allowance will not necessarily equal true economic depreciation. In fact, the two will differ in most cases. The taxable depreciation allowance depends on

the rules for computing the depreciable lifetime of assets and the time path of the capital stock. For purposes of the present analysis, assume that Z can be factored as

$$Z = \zeta k, \quad (15)$$

where ζ is some constant. As will be seen later on, all depreciation allowances examined in this study can be factored into such a form.

Substituting (14) and (15) into (13) yields an expression for after-tax cash flows as a function of the steady-state capital stock, k , and the other underlying variables of the model:

$$X_a = [(1 - \theta)\psi + \theta\lambda_1\rho_1 - (\delta - \theta\zeta)]k. \quad (16)$$

The after-tax value of the investment, V_a , is just the present value of its after-tax net cash flow discounted using the after-tax cost of capital:

$$V_a = \rho^{-1}X_a. \quad (17)$$

In equilibrium, the present value of the firm's cash flows will equal the cost of the initial capital stock purchased by the firm. Thus,

$$V_a = k.$$

This last relation implies

$$\psi = \gamma_p(\theta) + \frac{\delta - \theta\zeta}{1 - \theta}, \quad (18)$$

where

$$\gamma_p(\theta) = \lambda_1\rho_1 + \lambda_2\left(\frac{\rho_2}{1 - \theta}\right) \quad (19)$$

is the pre-tax financial cost of capital. The pre-tax cost of capital differs from the after-tax cost of capital, ρ , in that the after-tax return to equity, ρ_2 , is divided by $(1 - \theta)$ in (19). The best way to understand this result is to note that the presence of a corporate income tax requires the firm to earn a pre-tax rate of return on equity of $\rho_2/(1 - \theta)$ so it can pay out an after-tax rate of ρ_2 to its shareholders.

Now examine the second term on the right-hand side of (18). This term reflects the cost of depreciation, net of any taxable depreciation expenses. To appreciate the economic interpretation of this term, note that

$$\frac{\delta - \theta\zeta}{1 - \theta} = \delta + \frac{\theta(\delta - \zeta)}{1 - \theta}. \quad (20)$$

The cost of depreciation in the presence of corporate income taxes is the true depreciation rate plus the cost of the tax distortion stemming from any differences between the true economic depreciation rate and the depreciation allowance permitted for tax purposes. In the special case where the taxable depreciation allowance exactly equals true economic depreciation (that is, when $\zeta = \delta$), the

right-hand side term in (20) reduces to the true economic cost of depreciation, δ . But when $\zeta < \delta$, the effective cost of depreciation under taxation is greater than it would be otherwise. In this case, the second term on the right-hand side of (20) shows how much the capital investment must earn at the margin to pay the added tax caused by the distortion in the tax code. Conversely, an excessively liberal depreciation allowance would effectively reduce the cost of depreciation.

Taken together, the sum appearing on the right-hand side of (18) reflects the firm's pre-tax user cost of capital. It shows how much the firm's capital investment must earn at the margin so as to pay investors in bond and equity markets the returns they expect after corporate income taxes and depreciation.

The User Cost of Capital for Commercial Bank Lending

Commercial banks are generally subject to the same tax rules as all other U.S. companies. Thus, the foregoing model of investment and capital budgeting can be applied to bank lending if the variables are interpreted differently. Instead of representing physical capital, let the variable k represent the dollar value of a portfolio of loans. Then, the marginal return on investment, ψ , can be viewed as the commercial loan rate. Under this interpretation, ψk denotes gross revenues from lending.

While bank loans do not depreciate the way physical capital does, banks do incur loan losses. Loan losses affect earnings in much the same way depreciation affects the productivity of physical capital in the model presented above: when a borrower defaults on a loan, the lender no longer receives income from that loan. Accordingly, let the variable δ now represent the fraction of a bank's loan portfolio that must be written off in each period. As before, assume δ is constant over time. Under this interpretation the variable Z can be viewed as the maximum loan loss provision permitted by the tax code. As with other types of depreciation allowances, the loan loss provision permitted by the tax code has not always equaled the true cost of loan losses.

To complete the analogy, let the variable D now denote the value of outstanding deposits. Then, the results derived above can be viewed as a first approximation of the user cost of capital for a bank. Applied to banks, however, the model omits at least two important features. The first is the implicit tax imposed by reserve requirements. The second is deposit insurance premiums.

Reserve requirements obligate banks to hold non-interest-bearing reserves in the form of vault cash or reserve accounts held with the Fed. Not all bank deposits are subject to reserve requirements. Currently, the Fed imposes a 10 percent reserve requirement only on transactions deposits—demand deposits and certain interest-bearing transactions accounts such as NOW

accounts.⁷ In the past, however, the Fed imposed reserve requirements on certain classes of time deposits as well.

Thus, consider a bank that issues three types of deposits as well as nondeposit debt, such as subordinated debt and bank notes. Let

$$\begin{aligned} D_1 &= \text{transaction deposits,} \\ D_2 &= \text{reservable time deposits,} \\ D_3 &= \text{nonreservable deposits, and} \\ D_4 &= \text{nondeposit debt.} \end{aligned} \tag{21}$$

Debt of type i pays an interest rate ρ_i , $i = 1, 2, 3, 4$. The cost of equity capital—that is, the rate of return required by the bank's shareholders—is ρ_5 . Under these assumptions, the bank's nominal after-tax cost of capital is

$$\rho = \sum_{i=1}^5 \lambda_i \rho_i, \tag{22}$$

where

$$\lambda_i = D_i/V, \quad i = 1, 2, 3, 4, \text{ and}$$

$$\lambda_5 = S/V.$$

As before, assume that the λ_i , $i = 1, 2, \dots, 5$, are fixed and constant over time, so that each type of debt outstanding is proportional to the initial capital stock. Formally,

$$\begin{aligned} D_1 &= \lambda_1 k, \\ D_2 &= \lambda_2 k, \\ D_3 &= \lambda_3 k, \text{ and} \\ D_4 &= \lambda_4 k. \end{aligned} \tag{23}$$

Reserve requirements reduce the bank's interest-earning assets by the fraction of the deposits it is forced to hold as non-interest-bearing reserves. Let α_1 and α_2 denote the required reserve ratio on deposits of type D_1 and D_2 , respectively. Then, total required reserves are $(\alpha_1 D_1 + \alpha_2 D_2)$. Total funds raised

⁷ Lower reserve requirements apply to the first \$52 million of transactions accounts outstanding at each bank, and this tranche changes each year depending on changes in the average amount of all transactions accounts outstanding. The present analysis ignores this low-reserve tranche.

by the bank, k , are allocated to loans, denoted by the variable b , plus required reserves. Formally,

$$k = b + \alpha_1 D_1 + \alpha_2 D_2.$$

Substituting in for D_1 and D_2 from equation (23) yields

$$k = b + (\alpha_1 \lambda_1 + \alpha_2 \lambda_2)k,$$

which can be rewritten as

$$(1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)k = b. \quad (24)$$

Equation (24) expresses the relation between total funds raised and the amount available to be invested in loans. The term $(1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)$ is the fraction of each dollar the bank raises that is available for investment in loans. The remainder goes to satisfy reserve requirements. Thus, nominal interest revenues are ψb , the true cost of depreciation is δb , and the taxable depreciation allowance is ζb . Using (24), interest and depreciation expenses can be expressed as a function of the capital stock, k . The result is

$$\begin{aligned} \psi b &= (1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)^{-1} \psi k, \\ \delta b &= (1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)^{-1} \delta k, \text{ and} \\ Z &= (1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)^{-1} \zeta k. \end{aligned} \quad (25)$$

Banks are also required to pay deposit insurance premiums on all domestic deposits. Let the symbol β denote the deposit insurance premium. Then, total deposit insurance premiums paid by the bank are

$$\beta \sum_{i=1}^3 D_i.$$

Total taxable profits are gross revenues from lending less deposit insurance premiums, interest expense, and the provision for loan losses. Letting π denote taxable profits once again and R denote total interest payments made by the bank to depositors and bondholders,

$$\pi = \psi b - \beta \left(\sum_{i=1}^3 D_i \right) - R - Z. \quad (26)$$

The bank's after-tax cash flow is just its revenues less loan losses, deposit insurance premiums, and taxes:

$$X_a = (\psi - \delta)b - \beta \sum_{i=1}^3 D_i - \theta \pi. \quad (27)$$

Substituting the expression for taxable profits (equation [26]) into (27) yields

$$X_a = (1 - \theta)\psi b - (1 - \theta)\beta \sum_{i=1}^3 D_i + \theta R - (\delta b - \theta Z). \quad (28)$$

Consider the relation between interest expenses and the capital stock. Let R_i , $i = 1, \dots, 4$, denote total interest payments on debt of type i . Then,

$$\begin{aligned} R_i &= \rho_i D_i \\ &= \lambda_i \rho_i k, i = 1, \dots, 4, \end{aligned}$$

and

$$\begin{aligned} R &= \sum_{i=1}^4 \rho_i D_i \\ &= \rho_D k, \end{aligned} \quad (29)$$

where

$$\rho_D = \sum_{i=1}^4 \lambda_i \rho_i \quad (30)$$

is the weighted-average nominal interest cost.

Substituting from (25) and (29) into (28) yields an expression for net cash flows as a function of the value of the initial investment, k :

$$\begin{aligned} X_a &= \left[(1 - \theta) \left((1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2) \psi - \beta \left(\sum_{i=1}^3 \lambda_i \right) \right) \right. \\ &\quad \left. + \theta \rho_D - (1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2) (\delta - \theta \zeta) \right] k. \end{aligned} \quad (31)$$

The after-tax discounted value of this investment is $V_a = \rho^{-1} X_a$. As before, the bank's user cost of capital can be derived by imposing the equilibrium condition $V_a = k$. The result is

$$\psi = \frac{\gamma_p(\theta, \beta)}{1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2} + \frac{\delta - \theta \zeta}{1 - \theta}, \quad (32)$$

where

$$\gamma_p(\theta, \beta) = \sum_{i=1}^3 \lambda_i (\rho_i + \beta) + \lambda_4 \rho_4 + \lambda_5 \left(\frac{\rho_5}{1 - \theta} \right). \quad (33)$$

denotes the pre-tax financial cost of capital.

These last two expressions are very similar to those derived in the previous case (equations 18 and 19) except that the pre-tax financial cost of capital in (33) now includes the cost of deposit insurance premiums. Thus, $\rho_i + \beta$ is the effective cost of issuing deposits of type i , $i = 1, 2, 3$, not including the cost of reserve requirements.

Notice also that the expression for the user cost of capital in (32) differs from the earlier user cost of capital presented in (18) in that the pre-tax financial cost of capital, $\gamma_p(\theta, \beta)$, is now divided by the term $(1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2)$ to reflect the cost of reserve requirements. The firm must now earn a marginal rate of return

$$\frac{\lambda_p(\theta, \beta)}{1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2} > \lambda_p(\theta, \beta)$$

after accounting for the after-tax loan loss expense, $((\delta - \theta z)/(1 - \theta))$, to pay its depositors and shareholders the return on investment they expect.

Loan Loss Allowances

Banks report loan loss reserves, also known as provisions for loan losses, on their balance sheets as an estimate of probable future loan losses. Under generally accepted accounting principles (GAAP), any additions to loan loss reserves, termed loan loss allowances, are deducted from reported income in the period the provisions are made and not in the period when the loss actually occurs. When a bank subsequently determines that a loan is uncollectible, it reduces its loan loss reserves by the amount of the loss. Because the impact of the loan loss on earnings is taken into account when the loan loss reserve is created, the act of writing off the loan has no direct impact on income reported in that period.

For a variety of reasons, banks typically maintain loan loss reserves in excess of their expected losses for the coming year.⁸ Before 1987, the tax code permitted all commercial banks to deduct loan loss allowances, up to a stipulated maximum, from taxable income. The Tax Reform Act of 1986 changed the rules for computing deductions for loan losses, however, reducing the loan loss deductions available to many banks. The discussion that follows describes the tax treatment of loan loss allowances, both before and after the Tax Reform Act.

The Tax Treatment of Loan Loss Allowances for Large Banks

Since 1987, “large” commercial banks (banks with assets over \$500 million) have been permitted to deduct loan losses from taxable income only as they are recognized. Many analysts feel that this rule, known as the “specific charge-off” method, produces the most accurate measure of true economic income, as it requires banks to recognize both interest income and loan losses in the year they accrue.⁹ If one accepts this argument, the current tax treatment of loan loss allowances accorded to large banks specifies a deductible loan loss allowance that equals the true “depreciation” of the loan portfolio. To model the post-1987 loan loss provision for large banks, then, set

$$Z = \delta b. \tag{34}$$

⁸ See Walter (1991) for a more detailed discussion of the factors determining loan loss reserves.

⁹ See, for example, Buynak (1987), Neubig (1984), and Neubig and Sullivan (1987). For a dissenting view, see Henderson (1987).

In this case, the user cost of capital given in equation (32) reduces to

$$\frac{\gamma_p(\theta, \beta)}{1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2} + \delta, \quad (32')$$

where $\gamma_p(\theta, \beta)$ is as given in equation (33).

Tax Treatment of Loan Loss Allowances for Small Banks

A “small” bank (one with assets less than \$500 million) can choose between the specific charge-off method and the “experience reserve” method. Under the experience reserve method, a bank may deduct additions to its bad debt reserves up to a maximum amount determined by the product of its eligible loans outstanding and a six-year moving average of its historical loan loss ratio. To see how this method works, let $\delta(t)$ denote the actual loan loss ratio experienced in year t , and $\bar{\delta}(t) = (1/6) \sum_{i=0}^5 \delta(t-i)$ the moving-average of the current and past five years of loan loss ratios. Then, the maximum loan loss reserve (LLR) permitted in year t is

$$\text{LLR}(t) = \bar{\delta}(t)b(t),$$

where $b(t)$ denotes eligible loans outstanding in period t . The corresponding maximum loan loss allowance deduction is

$$Z(t) = \delta(t)b(t) + (\text{LLR}(t) - \text{LLR}(t-1)). \quad (35)$$

If the size of a bank’s loan portfolio does not change over time, then the experience reserve method is roughly equivalent to the specific charge-off method. In the case of a bank with a growing loan portfolio, however, use of the experience reserve method has the effect of accelerating the recognition of future loan loss deductions and causes taxable income to understate true economic income (Neubig and Sullivan 1987). To simplify notation and better understand the properties of these provisions, assume that the loan loss ratio is constant over time; that is, assume that $\delta(t) = \delta$ for all t . Then, $\bar{\delta}(t) = \delta$ and

$$Z(t) = \delta(b(t) + \Delta b(t)), \quad (36)$$

where $\Delta b(t) = b(t) - b(t-1)$ is the change in eligible loans outstanding from year $(t-1)$ to year t . Clearly, this reduces to the specific charge-off method currently permitted to all banks when $\Delta b(t) = 0$.

To examine the more general case where the bank’s loan portfolio may grow over time, let

$$\mu = \Delta b(t)/b(t).$$

Substituting this last result into equation (36) yields the following expression

$$Z(t) = \delta(1 + \mu)b(t).^{10} \quad (37)$$

Tax Treatment of Loan Loss Allowances before Tax Reform

Before 1987, commercial banks were permitted to choose among several different methods for calculating the taxable loan loss allowance: the experience method, the specific charge-off method (both as described above), and the “percentage method.” The percentage method was similar to the experience method, except that the deductible loan loss allowance was 0.6 percent of total eligible loans outstanding. As before, let $LLR(t)$ denote the allowable loan loss reserve in year t . Then, the allowable loan loss allowance would be calculated as in equation (35) above, except that in this case

$$LLR(t) = 0.006b(t).$$

Substituting this last specification into equation (35) yields the result

$$Z(t) = \delta b(t) + 0.006\Delta b(t). \quad (38)$$

In the special case where the size of a bank’s loan portfolio stays constant over time, $\Delta b(t) = 0$ and the above expression reduces to $Z(t) = \delta b(t)$, which is the same as the deduction permitted under the specific charge-off method. In the more general case where $\Delta b(t) = \mu b(t)$, one obtains

$$Z(t) = (\delta + 0.006\mu)b(t). \quad (39)$$

Substituting this last result into equation (32) yields the following expression for a bank’s user cost of capital under the percentage method

$$\frac{\gamma_p(\theta, \beta)}{1 - \alpha_1\lambda_1 - \alpha_2\lambda_2} + \left(\delta - \frac{0.006\theta\mu}{1 - \theta} \right), \quad (32'')$$

where, as before, $\gamma_p(\theta, \beta)$ is as given in equation (33).

Loan Loss Reserve Recapture Provisions

In addition to eliminating the percentage method, the Tax Reform Act of 1986 also required large banks to recapture any existing loan loss reserves in excess of actual losses. Under this provision, large banks were required to report as income a fraction of 10 percent of excess bad debt reserves in 1987, 20

¹⁰ The astute reader will note what seems to be a logical inconsistency here, as the foregoing analysis has assumed a constant loan portfolio size while the depreciation rules allow for a growing loan portfolio. Interested readers are invited to verify that the results presented in the text would remain unchanged in all substantive respects if loan portfolio growth were taken into explicit account in the capital budgeting problem.

percent in 1988, 30 percent in 1989, and 40 percent in 1990.¹¹ Assuming that banks knew that their excess loan loss reserves would be subject to recapture after 1986, these recapture provisions would effectively reduce the value of the 1986 loan loss deduction by the expected present value of future excess tax payments.¹²

To calculate the present value of the recapture provisions, one must take into account any expected future changes in the statutory tax rate. In addition to mandating the recapture of the loan loss reserve, the Tax Reform Act also lowered the statutory corporate tax rate from 46 percent in 1986 to 40 percent in 1987 and to 34 percent thereafter. As a result, a dollar in loan loss reserves deducted before 1987 produced a 46-cent reduction in taxes, while the subsequent recapture of a dollar in loan loss reserves increased future taxes by a smaller amount. Thus, the present value of 1987 taxes attributable to the loan loss recapture would have been $(0.40)(0.1)e^{-\rho}$. Similarly, the present value of taxes due to the loan loss recapture for subsequent years would have been

$$(0.34)(0.2e^{-2\rho} + 0.3e^{-3\rho} + 0.4e^{-3\rho}).$$

On net, then, taking account of the recapture provisions, the expected present value of the loan loss allowance to a large bank in 1986 would have been

$$Z(1986) = \{ \delta + 0.006[\mu - (40/46)(0.1e^{-\rho}) - (34/46)(0.2e^{-2\rho} + 0.3e^{-3\rho} + 0.4e^{-4\rho})] \} b(1986). \quad (40)$$

3. THE MARGINAL EFFECTIVE TAX RATE ON COMMERCIAL BANK LENDING

The foregoing analysis has been almost entirely theoretical, focusing on the qualitative effects of explicit and implicit taxes on the user cost of capital. A purely theoretical analysis does not permit one to gauge the quantitative importance of specific tax rules, however. Nor can it answer questions regarding

¹¹ The act provided exceptions for financially troubled institutions, which were permitted to defer payment of taxes on the amount of the recapture. It also permitted banks to accelerate the recapture. This last provision permitted banks reporting losses between 1987 and 1990 to avoid paying at least part of the tax on the recapture (see U.S. Congress, 1987, pp. 549–57). The present analysis ignores such considerations.

¹² Even in the absence of the Tax Reform Act of 1986, banks' authorization to use the percentage method would have expired after 1987 (Henderson 1987). The tax reform of 1969 had instituted a gradual reduction of the maximum limit on loan loss reserve deductions, and the expiration of the authority to use this method was expected to trigger some type of recapture. Nor did the banking industry have reason to expect that forthcoming legislation would reinstate this deduction. The U.S. Treasury had given the treatment of bad debt reserves special attention during the debate over tax reform (see Neubig [1984]). Therefore, although the Tax Reform Act was not passed until the summer of 1986, it seems reasonable to assume that commercial banks expected they would be required to recapture their excess loan loss reserves after 1987.

the overall impact of legislation such as the Tax Reform Act of 1986, which lowered statutory tax rates while imposing offsetting reductions in the allowable deduction for loan losses. To answer such questions, one needs an empirical measure of the user cost of capital for banks.

Figure 1 depicts the behavior of the pre-tax and after-tax user cost of capital for commercial bank lending from 1986 to 1995. This period is an interesting one, as it includes a major change in tax laws and two separate instances where reserve requirements were reduced. The data used to compute these series were obtained from various reports that all insured banks must file routinely with the federal regulatory agencies. Both series were obtained by aggregating year-end data on all domestic commercial banks.¹³ As such, these series represent industrywide weighted averages. The values of the parameters characterizing tax rules and reserve requirements during this period are summarized in Table 1.

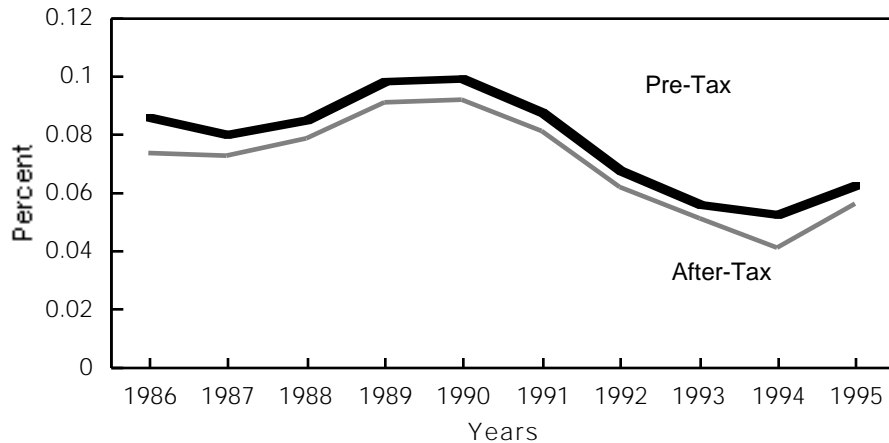
The pre-tax cost of capital in Figure 1 is calculated using the formulas specified in equations (32) and (33). In accordance with the earlier discussion of the tax treatment of loan loss allowances, the loan loss deduction for 1986 includes the present value of the future loan loss reserve recapture mandated by the Tax Reform Act, as characterized in equation (40).¹⁴ The loan loss allowance for subsequent years is based on the formula in equation (34). Thus,

$$\zeta = \begin{cases} \delta + 0.006[\mu - (40/46)0.1e^{-\rho} - (34/40)(0.2e^{-2\rho} \\ + 0.3e^{-3\rho} + 0.4e^{-4\rho})] \text{ for } t = 1986, \text{ and} \\ \delta \text{ for } t \geq 1987. \end{cases}$$

The after-tax cost of capital is just the pre-tax cost of capital with all tax parameters, α_i , θ , and ζ , set to zero. How best to treat deposit insurance premiums presents certain conceptual problems. To the extent that deposit insurance reduces funding costs for banks, the deposit insurance premium, β , just reflects the offsetting cost of the financial guarantee. If deposit insurance were privately provided and supplied at a market-determined price, the deposit insurance premium would not be viewed as a tax on commercial bank intermediation. As noted earlier, however, FDIC deposit insurance premiums may not always reflect the fair market value of the underlying guarantee. If they are set too low, they represent a subsidy. If they are increased to raise funds for other purposes, such as rescuing a competing deposit insurance fund, deposit insurance premiums can constitute a tax. For the present, assume that deposit

¹³ A more detailed description of data sources and calculations can be found in the Appendix.

¹⁴ For now, I assume that all banks are "large" banks that are subject to the specific charge-off method and the recapture of loan loss reserves. In later sections, I will examine the marginal impact of the loan loss recapture provisions of the Tax Reform Act of 1986 and the marginal tax benefit of the experience reserve method, which small banks continued to enjoy throughout the period under consideration.

Figure 1 Pre-Tax and After-Tax User Cost of Capital

insurance is fairly priced. Accordingly, the after-tax cost of capital in Figure 1 is calculated according to the formula

$$\gamma_a(\beta) = [\lambda_1(\rho_1 + \beta) + \lambda_2(\rho_2 + \beta) + \lambda_3(\rho_3 + \beta) = \lambda_4\rho_4 + \lambda_5\rho_5] + \delta. \quad (41)$$

The marginal impact of deposit insurance premiums on the cost of capital will be examined in a later section.

The Taxation of Commercial Banking: 1986–1995

There are several ways in which one can measure the marginal effective tax rate. The simplest measure is the difference between the pre-tax and after-tax cost of capital, which reflects the marginal cost of taxes on investment returns. Alternatively, the marginal effective tax rate can be expressed as a percentage either of the pre-tax or after-tax cost of capital.¹⁵ Figure 2 depicts the behavior of the marginal effective tax rate, measured as the difference between the pre-tax and after-tax user cost of capital. Notice that the marginal effective tax rate has fallen on average over the period in question, from a high of 126 basis points in 1986 to under 70 basis points in recent years. Most of this decline took place in the two years immediately following enactment of the Tax Reform Act of 1986, corresponding to the period in which the reductions in the statutory tax rate mandated by the act were phased in. By 1988, the marginal effective tax

¹⁵ See Bradford and Fullerton (1981) for an analysis of the properties of these different summary statistics.

Table 1 Summary of Tax Parameter Values

	Statutory Tax Rate (θ) (percent) ^a	Present Value of the Deduction for Loan Loss Allowances ($Z(t)$), (Large Banks)	Reserve Requirements ^b
1986	46	$\delta + [0.006(\mu - \left(\frac{40}{46}\right)(0.1e^{-\rho}) - \left(\frac{34}{46}\right)(0.2e^{-2\rho} + 0.3e^{-3\rho} + 0.4e^{-4\rho})b(t)]$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 3\%$ ^c
1987	40 ^d	$\delta b(t)$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 3\%$ ^c
1988	34	$\delta b(t)$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 3\%$ ^c
1989	34	$\delta b(t)$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 3\%$ ^c
1990	34	$\delta b(t)$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 3\%$
1991	34	$\delta b(t)$	Transaction: $\alpha_1 = 12\%$ Time: $\alpha_2 = 0\%$
1992–1995	34	$\delta b(t)$	Transaction: $\alpha_1 = 10\%$ ^e Time: $\alpha_2 = 0\%$

^a Before the Tax Reform Act of 1986, corporations with taxable income below \$100,000 were subject to a lower rate. In addition to lowering the statutory tax rate to 34 percent, the act changed the graduated tax structure. Starting in 1987, the threshold for lower tax rates was lowered to \$75,000. Both before and after the Tax Reform Act, corporations with incomes exceeding the threshold were subject to a surcharge meant to recover the benefit of lower tax rates on income below the threshold. Currently, corporations must pay a 5 percent surcharge on income over \$100,000 up to a maximum of \$11,750. As a result, corporations with taxable incomes over \$335,000 pay both an average and a marginal statutory rate of 34 percent. (For more details, see U.S. Congress [1987], pp. 271–72.) In constructing the weighted-average cost of capital, it was assumed that all banks were subject to the maximum statutory tax rate.

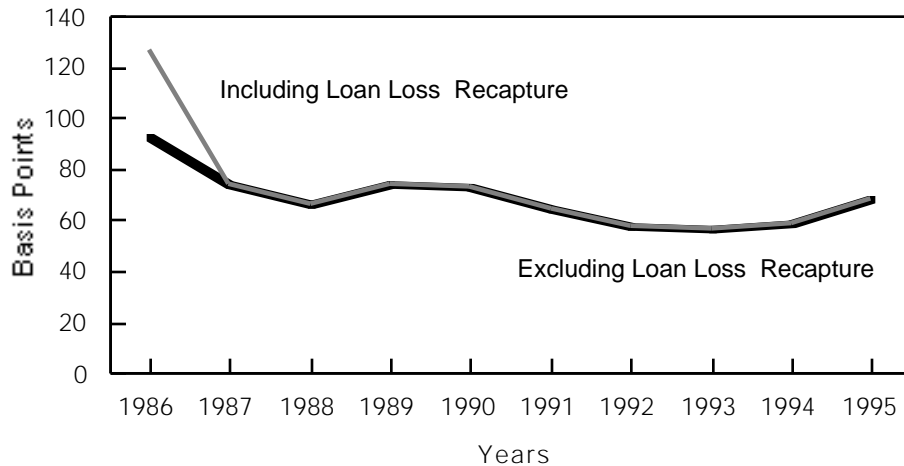
^b The Garn-St. Germain Depository Institutions Act of 1982 required that \$2 million of reservable liabilities of each depository institution be subject to a zero percent reserve requirement. The act instructs the Board of Governors to adjust the amount of reservable liabilities subject to this zero percent reserve requirement each year by 80 percent of the annual percentage increase in the total reservable liabilities of all depository institutions. In 1996, this zero-reserve tranche was raised to \$4.3 million.

The Monetary Control Act of 1980 established a low-reserve tranche against which a 3 percent reserve requirement is applied. In 1995, a 3 percent reserve requirement was applied to the first \$52 million in reservable deposits. As with the zero-reserve tranche, this amount is adjusted each year by 80 percent of the total percentage increase in the total reservable liabilities of all depository institutions. The user cost of capital calculations ignores the zero- and low-reserve tranches, since, at the margin, virtually all banks are subject to the higher reserve requirement listed in the table.

^c During this period, reserve requirements on time deposits applied only to nonpersonal time deposits with an original maturity less than 1½ years. The reserve requirement on nonpersonal time deposits was reduced to zero at the end of 1990.

^d The Tax Reform Act of 1986 reduced the maximum statutory tax from 46 percent to 34 percent, effective for taxable years beginning on or after July 1, 1987. Income in taxable years including July 1, 1987, was subject to a blended rate. According to the methodology specified in the act, the effective statutory tax rate for the 1987 calendar year would have been calculated as $(181/365) \times (40\%) + (184/365) \times (34\%) = 40\%$, as there were 181 days between January 1, 1987, and June 30, 1987, and 184 days between July 1, 1987, and December 31, 1987. For more details, see U.S. Congress (1987), pp. 272–73.

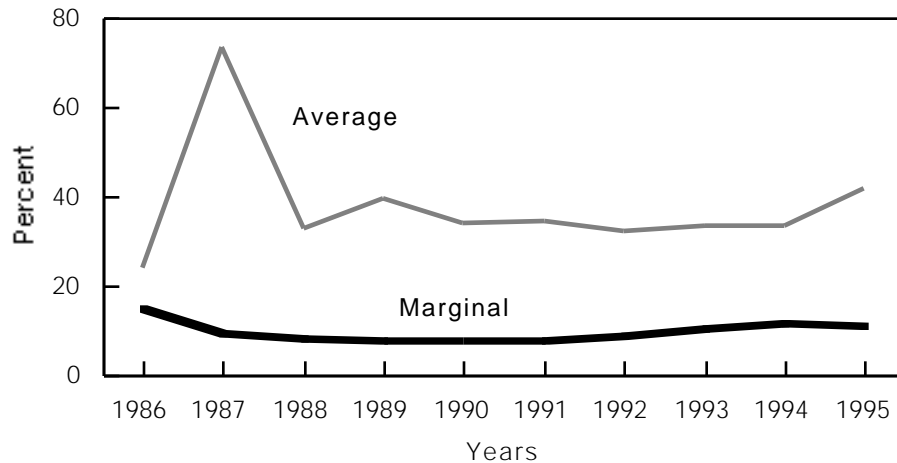
^e The reserve requirement on transaction deposits was reduced from 12 to 10 percent in April 1992.

Figure 2 The Marginal Effective Tax Rate on Commercial Bank Lending

rate had fallen by almost half, to 66 basis points, suggesting that the reduction in the statutory corporate tax rate more than offset the loss of the loan loss reserve deduction.

Figure 3 compares the behavior of the marginal effective tax rate with that of the average tax rate, computed as taxes paid as a percent of pre-tax earnings. To facilitate comparison, the marginal effective tax rate in Figure 3 is expressed as a percent of the pre-tax cost of capital. In light of the earlier discussion, it should not be surprising to find that the behavior of the marginal effective and average tax rate measures differ so much. Whereas the marginal effective rate falls dramatically after 1986, the average tax rate rises. The difference in the behavior of these two series is in part due to the timing of the recognition of cash flows. Recall that the marginal effective tax rate incorporates the full present value of the future loan loss recapture in 1986—consequently, the cost of recapture does not influence the marginal tax rate in later years. In contrast, the measured average tax rate recognizes these taxes only as they accrue.

The behavior of the average tax rate also reflects other changes in tax rules that did not affect the incentive of commercial banks to make loans. One of the major provisions of the Tax Reform Act of 1986 was the repeal of the tax deductibility of interest payments on municipal bonds. Before 1987, commercial banks paid no taxes on interest earned on municipal bonds, while interest payments on bank debt issued to fund such investments was tax deductible. Partly as a result of this favorable tax treatment, the average tax rate for commercial banks tended to be low, especially when compared to the average tax rate on most other industries. The perception that banks enjoyed

Figure 3 Comparison of Average and Marginal Effective Tax Rates

too many tax advantages led Congress to repeal the tax deduction on interest from municipal bonds, along with the tax deduction for bad debt reserves.¹⁶ As Henderson (1987), Neubig and Sullivan (1987), and O'Brien and Gelfand (1987a, b) note, however, the increase in the average tax rate due to the repeal of the tax deduction for interest on municipal bonds is largely illusory. Because interest paid on municipal bonds is not subject to federal taxes, interest rates on such bonds tend to be lower than interest rates on taxable bonds—in fact, the interest rates paid on municipal bonds tend to be comparable to after-tax interest rates on taxable bonds. Thus, the interest rate differential between taxable and nontaxable bonds can be viewed as an implicit tax. After losing this tax deduction in 1987, banks tended to substitute taxable bonds for municipal bonds, with the result that taxable income increased along with taxes paid. Although banks paid higher federal taxes on average, the impact on their after-tax return was minimal. The principal result of this change in tax laws, then, was to substitute explicit taxes paid to the federal government for implicit taxes that were previously paid to municipalities.

Despite these considerations, Figure 3 does hold a seeming puzzle. Note that the marginal effective tax rate tends to be much lower than the measured average tax rate; this despite the inclusion of the cost of reserve requirements and deposit insurance premiums in the marginal rate but not in the average rate. Three different factors can help explain this apparent anomaly. First, Henderson

¹⁶ See U.S. Congress (1987).

(1987) notes that many large banks have substantial foreign operations, which are subject to higher tax rates. Second, to the extent that nonfinancial assets are effectively taxed at a higher rate than financial assets such as commercial loans, the result would be to raise the average tax rate above the marginal effective tax rate on lending. Finally, the marginal effective tax rate calculations derived earlier and illustrated in Figures 2 and 3 assume banks earn no pure economic profits. To the extent that banks do earn economic profits, the marginal effective tax rate on such profits just equals the statutory tax rate, which is currently 34 percent.¹⁷

The Long-Run Impact of Tax Reform

As noted earlier, the data depicted in Figure 2 suggest that the reductions in the statutory corporate income tax rate that took place in 1987 and 1988 more than offset the loss of the tax deduction for the bad-debt reserve. Care must be taken in interpreting this result, however, because the marginal effective tax rate is influenced by many factors, not just changes in tax rules. Moreover, the influence of the future recapture of the deduction for loan loss reserves mandated by the Tax Reform Act exerted a significant transitory influence on the marginal effective tax rate in 1986.

A measure of the long-run marginal impact of the Tax Reform Act on the marginal effective tax rate can be calculated by computing the user cost of capital for a single year under the two sets of tax rules, ignoring recapture provisions. The results of such an exercise, performed using 1986 data, are presented in Table 2. When the effect of the recapture provisions is excluded, the marginal effective tax rate for 1986 falls to 92 basis points—thus, the marginal impact of the recapture provisions was 34 basis points. Recomputing the 1986 user cost of capital assuming a 34 percent tax rate and adopting the specific charge-off method reduces the marginal effective tax rate another 30 basis points. From these two exercises, one can conclude that about half of the observed decline in the marginal effective tax rate between 1986 and 1988 was attributable to the long-run impact of tax reform. Although other factors also contributed to the observed decline in the marginal effective tax rate during this period, their influence was minimal.

Tax Reform and Small Banks

The last exercise ignored the differential treatment accorded to small banks by the Tax Reform Act and assumed that all banks lost the loan loss reserve deduction. Recall, however, that small banks were permitted to continue using the experience reserve method in determining their loan loss deduction. What impact did tax reform have on these institutions?

¹⁷ See Bradford and Fullerton (1981) for a more comprehensive discussion of this last issue.

Table 2 The Long-Run Marginal Impact of Tax Reform on the Marginal Effective Tax Rate^a

	Effective Tax Rate, Including Recapture (basis points)	Effective Tax Rate, Excluding Recapture (basis points)
Large Banks^b		
Before Tax Reform	126	92
After Tax Reform	63	63
Small Banks^c		
Before Tax Reform	NA	92
After Tax Reform	NA	63

^a Calculated using 1986 year-end industrywide financial data.

^b The marginal effective tax rate for large banks before tax reform was calculated using a statutory tax rate of 46 percent and assumes that banks used the percentage method to calculate the loan loss allowance. The tax rate after tax reform was computed assuming a 34 percent statutory tax rate and assumes that banks use the specific charge-off method.

^c The user cost of capital for small banks is based on the same data used in the large bank example, except that the calculations assume use of the experience reserve method, under which $\zeta = \delta(t) + \bar{\delta}(t)\mu$, where $\bar{\delta}(t) = \left(\frac{1}{6}\right) \sum_{i=0}^5 \delta(t-i)$ and μ represents the growth rate of eligible loans. As with the first exercise, the before-tax-reform user cost of capital is calculated assuming a 46 percent statutory tax rate, and the after-tax-reform user cost is computed assuming a 34 percent tax rate.

An approximate measure of the marginal effective tax rate for small banks can be obtained using industrywide weighted averages. Specifically, consider a hypothetical representative “small” bank that experienced the same realized loan loss ratios and growth rates in outstanding loans as did the industry in the aggregate. Next, compute the user cost of capital assuming that this bank takes advantage of its option to use the experience reserve method, as characterized in equation (37). This last result can then be used to compute an marginal effective tax rate measure for small banks using the experience reserve method.

Table 3 compares the marginal effective tax rates under the specific charge-off (small bank) method with that obtained using the experience reserve (large bank) method.¹⁸ Notice that the two tax rates differ by no more than 6 basis points after 1986. The difference between the two in 1986 can be accounted for almost entirely by the present value of future loan loss recoveries imposed on large banks.

Evidently, the favorable treatment of loan loss reserves accorded to small banks by the Tax Reform Act of 1986 has had only a small impact on the

¹⁸ For 1986, the “large” bank effective tax rate calculation assumes that banks use the percentage method to calculate the taxable deduction for loan loss reserves.

Table 3 Comparison of the Marginal Effective Tax Rate for Large and Small Banks

	Large Banks	Small Banks	Difference
1986	126	92	34
1987	74	71	2
1988	66	64	2
1989	74	71	3
1990	73	72	1
1991	64	66	-2
1992	57	58	-1
1993	57	53	4
1994	59	53	6
1995	69	63	5

Note: All figures are expressed as basis points.

marginal effective tax rate on lending. The largest benefit to small banks conferred by the act was in exempting them from the recapture of past excess contributions to loan loss reserves.

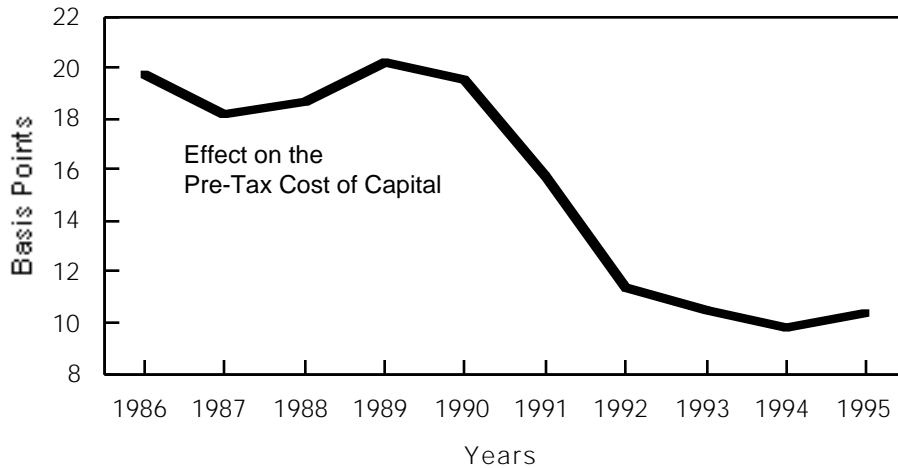
The Cost of Reserve Requirements

The derivation of the user cost of capital given in equation (32) showed how non-interest-bearing reserve requirements increase the cost of funding a loan. Figure 4 shows the net overall impact of reserve requirements on the user cost of capital from 1986 to 1995, obtained by calculating the difference between the pre-tax cost of capital, including the cost of reserve requirements, and the pre-tax cost of capital net of reserve requirements:

$$\frac{\gamma_p(\theta, \beta)}{1 - \alpha_1 \lambda_1 - \alpha_2 \lambda_2} - \gamma_p(\theta, \beta).$$

As Figure 4 shows, the cost of reserve requirements fell significantly after 1990, from approximately 20 basis points in that year to just over 10 basis points in 1994. There are at least three factors that might account for this decline. The first was the elimination of reserve requirements against time deposits in 1991 and a subsequent reduction from 12 to 10 percent in the required reserve ratio for transaction deposits in 1992. The second is a decline in interest rates. The third is a decline in banks' reliance on reservable deposits—to the extent that banks substitute nonreservable liabilities for those bearing reserve requirements, they can effectively avoid paying the implicit reserve requirement tax.

The elimination of reserve requirements against time deposits accounted for almost 2 basis points of the observed decline in Figure 4, while the reduction in the reserve ratio for transaction deposits accounted for just under 3 basis

Figure 4 The Cost of Reserve Requirements

points.¹⁹ The remainder of the reduction can be attributed to falling interest rates. Changes in the ratio of reservable deposits to other liabilities does not appear to have contributed to the observed reduction in the overall cost of reserve requirements.²⁰

Deposit Insurance and the Cost of Capital

From 1935 to 1989 all insured U.S. commercial banks paid the FDIC an annual statutory deposit insurance premium of 0.0833 percent of domestic deposits (or 8.33 basis points). The effective deposit insurance premium was often much lower, however, because the FDIC frequently rebated some portion of these premiums. Such rebates ended in the late 1980s after a large increase in the number of bank failures threatened to deplete the FDIC's Bank Insurance Fund (BIF). Using its newly acquired authority to increase deposit insurance assessments, the FDIC raised its assessments to 0.2125 percent in 1991 and again in 1992

¹⁹ Estimated cost savings stemming from the 1991 elimination of reserve requirements against nonpersonal time deposits were obtained by measuring the marginal cost of such reserve requirements at the end of 1990. Similarly, estimated cost savings associated with the 1992 reduction in required reserve ratios on transaction deposits reflect the marginal cost of holding an extra 2 percent reserve requirement at the end of 1991.

²⁰ Although the importance of demand and other transaction deposits has fallen substantially in the past 25 years, transaction deposits accounted for approximately 20 percent of the value of debt plus equity throughout the period 1986–1990, falling slightly from 1985 to 1990 and rising modestly thereafter.

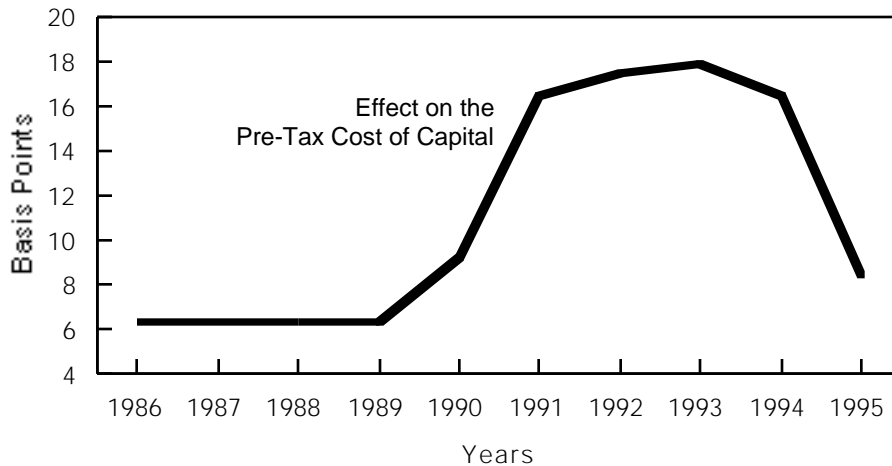
to 0.23 percent. Following a congressional mandate, the agency adopted risk-based assessments in 1993. Under this latter system, banks paid assessments in the range of 0.23 to 0.31 percent. The minimum assessment was lowered to 0.044 percent in mid-1995 after BIF reached its mandated capitalization level, and well-capitalized and well-managed banks received a small rebate that year. In 1996, the FDIC reduced its risk-based premiums further to a range of zero to 0.31 percent.²¹

Figure 5 shows the marginal contribution of the cost of deposit insurance premiums to the pre-tax user cost of capital, calculated by subtracting a measure of the pre-tax user cost of capital that excludes deposit insurance premiums from the pre-tax user cost including deposit insurance premiums. The dramatic increase in the cost of deposit insurance after 1989 reflects the increases in effective deposit insurance assessments imposed during this period. These increases had a substantial impact on banks cost of capital. From 1992 to 1994, deposit insurance premiums contributed between 16 and 18 basis points to the pre-tax user cost of capital, up from 6 basis points in 1988.

Whether deposit insurance assessments should be treated as a tax on the banking industry depends on how fairly the FDIC's assessments reflect the cost of its financial guarantee. A recent study by Epps, Pulley, and Humphrey (1996) computed "fair" deposit insurance premiums for a sample of 77 banks using 1989 data. That study found that the median fair deposit insurance premium was 0.0107 percent of deposits (assuming one bank examination per year), compared to the 0.0833 deposit insurance premium charged that year. At first glance, these findings seem to suggest that deposit insurance is overpriced. A closer look at the authors' results reveals certain important mitigating factors, however. The fair deposit insurance premiums for individual banks in the study ranged from a low under 0.0001 percent to a high of 0.7749 percent. The authors note, however, that the FDIC can reduce the effective cost of its liability to depositors of a troubled bank through more frequent monitoring, which is the current policy of the bank regulatory agencies.²² Nonetheless, these findings indicate that deposit insurance requires well-managed and conservatively run banks to subsidize banks that pose greater risks to the deposit insurance fund. To be sure, the adoption of risk-based assessments has ameliorated this problem somewhat. But although the adoption of risk-based assessments has reduced the subsidy to risky banks, the findings of Epps, Pulley, and Humphrey (1996) indicate that the current risk-based assessment scheme would not have been sufficient to eliminate the subsidy to the riskiest banks in 1989. What Figure 5 shows, then, is the deposit insurance tax on the safest banks. Based on available

²¹ For more details, see FDIC (1995).

²² The fair deposit insurance premiums reported here do not include the cost of bank examinations. Epps, Pulley, and Humphrey (1996) also discuss examination costs.

Figure 5 The Cost of Deposit Insurance

information, it is not clear whether the current risk-based assessment scheme constitutes a tax on the industry as a whole.

Legislation enacted during 1996 does use the deposit insurance system to impose a tax on commercial banks, however. Beginning in 1997, all banks will be required to pay a special charge of 1.29 basis points to help pay the interest on bonds issued in 1987 to recapitalize the thrift industry's deposit insurance fund. That surcharge is scheduled to increase to 2.43 basis points in 1999. Understandably, the commercial banking industry resisted legislation requiring it to help pay for the losses incurred by the thrift industry. The banking industry had paid very high deposit insurance premiums during the early 1990s to recapitalize its own deposit insurance fund, and bankers did not wish to see their premiums raised once again to help rescue a competing industry's fund. My model shows that these surcharges will not have a dramatic impact on the banking industry's cost of capital, however. Using 1995 year-end data, the effect of a 1.29 basis point surcharge would be to increase the pre-tax user cost of capital by less than 1 basis point. A 2.43 basis point surcharge would produce an increase of less than 2 basis points.

4. CONCLUDING COMMENTS

In 1986, the banking industry paid an average effective tax rate of just under 24 percent. Since the enactment of the Tax Reform Act of 1986, however, the average effective tax rate has been over 30 percent. A cursory inspection of these data would seem to suggest that the tax burden on the banking industry

has risen in recent years. A closer look at the factors accounting for this rise suggest otherwise, however. The increase in the average tax rate paid by banks over the past decade is due largely to the elimination of the interest deduction on municipal debt for banks. Banks, in return, have responded by substituting into taxable corporate debt, which pays higher interest rates. Although banks now pay more federal taxes, they also earn more pre-tax income. Moreover, the elimination of the tax deduction for municipal debt had no impact on banks' incentive to extend other forms of credit, which is influenced by the marginal effective tax rate on bank lending.

An examination of the recent behavior of the marginal effective tax rate on bank lending paints a much different picture, suggesting that the tax disincentives to commercial bank intermediation have fallen modestly over the past ten years. The decline in the marginal effective tax rate is due principally to two factors. The first is the Tax Reform Act of 1986. Although tax reform resulted in higher average tax rates, it reduced the marginal effective tax rate on commercial bank lending. The second factor is the reduction in the implicit reserve requirement tax, which is due partly to reductions in reserve requirements and partly to declining interest rates.

This article began by questioning the extent to which the tax burden borne by the commercial banking industry may have contributed to the declining share of bank lending in credit markets. For many years, the commercial banking industry enjoyed special tax treatment, meant in part to compensate for the burden of regulation, including the cost of reserve requirements. Commercial banks now face the same federal tax rules as other lenders, however. At the same time, they also continue to bear the cost of reserve requirements. Although reserve requirements have been reduced in recent years, they still impose an approximately 10 basis point cost penalty on banks out of a total marginal effective tax rate of roughly 70 basis points. Even though the tax burden on commercial banking has fallen by some measures, implicit taxes continue to handicap the ability of banks to compete against other lenders. More importantly, recent statutory reductions in reserve requirements accounted for less than half of the reduction in the cost of reserve requirements in recent years—the rest was due to falling interest rates. In the absence of further policy actions, then, an increase in interest rates could increase the marginal effective tax rate on commercial bank lending substantially.

Many observers feel that any regulatory burden borne by banks, including the burden of reserve requirements, is mitigated by unique benefits such as deposit insurance and access to the Fed's discount window. The foregoing analysis showed that changes in deposit insurance assessments contributed substantially to the banking industry's cost of capital from 1992 to 1995. Deposit insurance assessments have fallen dramatically over the past year, however, and now account for a negligible fraction of the cost of financing a loan (except for the few banks that must pay the highest deposit insurance assessment rate of 31

basis points). Moreover, the estimated impact of the recent deposit insurance surcharge imposed on commercial banks to help pay for the recapitalization of the thrift industry's deposit insurance fund is exceedingly small and would appear to pose no undue burden on the industry. Whether deposit insurance represents a subsidy to the banking industry continues to be the topic of an active debate. Fortunately, the burden of explicit corporate taxes and the implicit cost of reserve requirements can be quantified.

APPENDIX : ESTIMATION OF THE USER COST OF CAPITAL

For the financial cost of capital, $\rho = \sum_{i=1}^5 \lambda_i \rho_i$, estimates of interest expense were obtained using data available in the *FDIC Historical Statistics on Banking*. The cost of equity capital was estimated using the basic CAPM model, following the procedure suggested by Ibbotson and Sinquefeld (1989). The estimate for the stock market beta needed for this calculation was obtained from Berkovec and Liang (1991). The results are summarized below.

THE AVERAGE COST OF EQUITY CAPITAL U.S. COMMERCIAL BANKS

Year	Risk-Free Interest Rate	Beta	Average Equity Premium	Cost of Equity (ρ)
1986	6.16%	0.95	0.88	14.52%
1987	5.47%	0.95	0.88	13.83%
1988	6.35%	0.95	0.88	14.71%
1989	8.37%	0.95	0.88	16.73%
1990	7.81%	0.95	0.88	16.17%
1991	5.60%	0.95	0.88	13.96%
1992	3.51%	0.95	0.88	11.87%
1993	2.90%	0.95	0.88	11.26%
1994	3.90%	0.95	0.88	12.26%
1995	5.60%	0.95	0.88	13.96%

Estimates of financial structure, as reflected by the parameters $\lambda_1, \lambda_2, \dots, \lambda_5$, were obtained from the Quarterly Reports of Condition and Income, or Call Reports, and from the Federal Reserve's Weekly Report of Transaction Accounts (FR2900). Data on loan charge-off rates came from the *FDIC Historical Statistics on Banking*, while data on effective deposit insurance assessments are from the *FDIC Annual Report* for 1995.

REFERENCES

- Berkovec, James A., and J. Nellie Liang. "Changes in the Cost of Equity Capital for Bank Holding Companies and the Effects on Raising Capital." Finance and Economics Discussion Series 160. Washington: Board of Governors of the Federal Reserve System, 1991.
- Bradford, David F., and Don Fullerton. "Pitfalls in the Construction and Use of Effective Tax Rates," in Charles R. Hulten, ed., *Depreciation, Inflation, and the Taxation of Income from Capital*. Washington: The Urban Institute Press, 1981.
- Buynak, Thomas M. "How Will Tax Reform Affect Commercial Banks?" Federal Reserve Bank of Cleveland *Economic Review* (Quarter 2, 1987), pp. 24–34.
- Epps, T. W., Lawrence B. Pulley, and David B. Humphrey. "Assessing the FDIC's Premium and Examination Policies Using 'Soviet' Put Options," *Journal of Banking and Finance*, vol. 20 (May 1996), pp. 699–721.
- Federal Deposit Insurance Corporation. *Annual Report 1995*. Washington: 1995.
- Fullerton, Don. "Which Effective Tax Rate?" *National Tax Journal*, vol. 37 (March 1984), pp. 23–41.
- _____, and Yolanda K. Henderson. "Long-Run Effects of the Accelerated Cost Recovery System," *Review of Economics and Statistics*, vol. 67 (August 1985), pp. 363–72.
- Hall, Robert E., and Dale W. Jorgenson. "Tax Policy and Investment Behavior," *American Economic Review*, vol. 57 (June 1967), pp. 391–414.
- Harberger, Arnold C. "Efficiency Effects of Taxes on Income from Capital," in M. Krzyzaniak, ed., *Effects of Corporation Income Tax*. Detroit: Wayne State University Press, 1966.
- Henderson, Yolanda. "The Taxation of Banks: Particular Privileges or Objectionable Burdens?" *New England Economic Review* (May/June 1987), pp. 3–18.
- Ibbotson, Roger G., and Rex A. Sinquefeld. *Stocks, Bonds, Bills, and Inflation: Historical Returns (1926–1987)*. Charlottesville, Va.: The Research Foundation of The Institute of Chartered Financial Analysts, 1989.
- McCauley, Robert N., and Rama Seth. "Foreign Bank Credit to U.S. Corporations: The Implications of Offshore Loans," Federal Reserve Bank of New York *Quarterly Review*, vol. 17 (Spring 1992), pp. 52–65.
- Neubig, Thomas S. "The Taxation of Financial Institutions After Deregulation," *National Tax Journal*, vol. 37 (September 1984), pp. 351–59.

- _____, and Martin A. Sullivan. "The Effect of the Tax Reform Act of 1986 on Commercial Banks," in *Compendium of Tax Research 1987*. Washington: Office of Tax Analysis, Department of the Treasury, 1987.
- O'Brien, James M., and Matthew D. Gelfand. "Corrigendum: The Impact of the Tax Reform Act of 1986 on Commercial Banks," *Tax Notes*, vol. 34 (March 30, 1987a), pp. 1323–25.
- _____. "Effects of the Tax Reform Act of 1986 on Commercial Banks," *Tax Notes*, vol. 34 (February 9, 1987b), pp. 597–604.
- U.S. Congress, Joint Committee on Taxation. *General Explanation of the Tax Reform Act of 1986*. Public Law 99–514, 100 Cong. 1 Sess. Washington: Government Printing Office, 1987.
- Walter, John R. "Loan Loss Reserves," Federal Reserve Bank of Richmond *Economic Review*, vol. 77 (July/August 1991), pp. 20–30.